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mitted speech in an ordinary phonographic apparatus, or, preferably in connection with a variable resistance contact, electrically in a receiving telephone.

There can be no doubt, whatever, that this method will be found operative in practice, since the engraving stylus, a pencil of light, is destitute of weight, and therefore offers no resistance to the free movements of the telephone diaphragm.

(10.) Instead of causing the voice, as in the ordinary form of phonographic or gramophonic apparatus, to act mechanically on the record-surface, cause it to move a suitably focussed pencil of light over the surface of a photographic plate. A very complete record could thus be obtained, in which it would be possible to impress on the plate all the minute peculiarities of the overtones, on which the quality of the voice depends. In this manner there could be obtained and preserved records of the voice of distinguished individuals.

The photographic method just described would possess, among others, the following advantages, viz.:

1st. The ease with which it could accurately reproduce in all their minutiae the tones involved in the production of articulate speech.

2d. The readiness with which such a record could be magnified to any desired extent, thus rendering possible an increase in the amplitude of the reproduced vibration.

3d. The aid such magnified, accurate sound-records would afford in the study of the same with a view, not only of ascertaining their peculiarities, but even with a view of being able to read articulate speech directly from the diaphragm record.

CENTRAL HIGH SCHOOL,
PHILADELPHIA, April 6, 1888.

Stated Meeting, April 20, 1888.

Present, 14 members.

President, Mr. FRALEY, in the Chair.

Correspondence was submitted as follows:

A letter from Washburn College, Topeka, Kansas, requesting exchanges; on motion, ordered to receive Proceedings from No. 96.

A letter from Prof. Joseph Prestwich, with change of address (Shoreham, Sevenoaks, Kent).

A letter of envoy from the Meteorological Office, London.

Letters acknowledging receipt of Proceedings, No. 126, from Sir William Thompson, South Kensington Museum (London) and M. Claudio Jannet, Paris.

The President reported that he had received letters in response to the circular in reference to a Congress to consider the question of an International Language, from James M. Taylor, President of Vassar College, Poughkeepsie, N. Y.; D. C. Gilman, President of Johns Hopkins University, Baltimore, Md.; Prof. W. LeConte Stevens, Brooklyn, N. Y.; Prof. B. L. Gildersleeve, Baltimore, Md.; President of the University of South Carolina; Director of the U. S. Nautical Almanac.

Accessions to the Library were received from Prof. George Bauer, Agram, Austria; Prof. P. Steiner, Darmstadt; Naturwissenschaft Verein, Frankfurt, a. O.; Geographische Gesellschaft, Hanover; Prof. Giuseppi Sergi, Rome; R. Academia di Ciencias, Madrid; Rousdon Observatory, Devon; Meteorological Council, British Association, Dr. B. W. Richardson, "The Earth," London; Historical and Scientific Society of Manitoba, Board of Trade, Winnipeg; Archæological Institute of America, Boston; Museum of Comparative Zoölogy, Cambridge; R. I. Historical Society, Providence; New York State Museum of Natural History, Albany; Buffalo Historical Society; Academy of Sciences, Prof. J. S. Newberry, New York; Mr. W. J. Potts, Camden; Geological Survey of New Jersey, Trenton; University of Pennsylvania, Mercantile Library, Profs. Lewis M. Haupt, Edwin J. Houston, Messrs. Henry Phillips, Jr., Richard Vaux, Com. E. Y. McCauley, Philadelphia; Departments of Justice, State and the Interior, Captain John G. Bourke, Washington, D. C.; University of Virginia; Prof. N. H. Winchell, St. Paul; California Academy of Sciences, San Francisco; Prof. Mariano Bárcena, Mexico.

The President stated that pursuant to the resolution of the Society, he had appointed P. DuBois, Esq., to prepare the obituary notice of Prof. James Curtis Booth, and Dr. John A. Ryder that of Joseph Zentmayer, and that they had accepted the appointments by letter.

Prof. Houston presented a communication on Some Possible

Methods for the Preparation of Gramophone and Telephone Records.

Mr. Phillips exhibited some specimens of *Physa heterostropha* found in water from the pipes of the drinking supply furnished by the Schuylkill river this and last Spring.

Prof. Houston and Dr. Morris spoke in relation to the impurity and insufficiency of the water supply of the city.

The President referred to the volume and condition of the water passing over the Fairmount dam, stating that the area of the pool has diminished but very little in later years, and that in his opinion the drinking water of the city was as pure as that supplied to New York and better than that to Boston. The President stated that he possessed a manuscript essay by Henry Campbell, C. E., of this city, containing a project for supplying City of New York with water by putting a very high dam some distance above the city, so as to prevent the salt water running up, and thus utilizing all the fresh water supplied by the Hudson river.

For Philadelphia, he proposed to collect the rain water in tanks and distribute it as needed.

Dr. J. Cheston Morris said that perhaps the supply water-pipe referred to by Mr. Phillips contained some bend in which the ova lodged and were hatched from time to time—the ova subjected to heat in the hot water-pipe being killed. Observation of our ordinary Schuylkill supply would soon satisfy one of the frequent existence in it of many forms of animal life. We greatly need in this city sufficient reservoirs for subsidence; our supply would then be comparatively good, and free from much of the present cause of complaint. The scouring of the pools and basins of the dams of the Schuylkill, which occurs during the freshets, would then remove much noxious material.

Prof. Houston having suggested the great lakes as probably a good future source of supply for our Eastern cities, Dr. Morris said, the results of their employment at Chicago were not such as to encourage us. And New York would hardly like to take the Erie canal as its source.

A serious question is that of change occurring in waters long impounded in reservoirs; but he believes, with Mr. E. F. Smith, that the waters of such reservoirs drawn from a distance of at least six or eight feet below the surface and as much above the bottom, so as to avoid the confervoid and bacterial growths near the surface, and the organic remains of previous life which settle to the bottom, would give the best results attainable. It has been shown also, by experience, that water contaminated with organic matter has a tendency to purify itself, in rapidly flowing streams interrupted by cascades or riffles, by the growth of animals and plants of the lower orders. While speaking on the subject, he would allude to the excellent character of the water supply from the Schuylkill as to its solid ingredients. Water may be too pure, *i. e.*, deficient in those salts and earthy matters which tend to maintain tissue-metamorphosis and growth; lime salts in moderate quantity are beneficial, while magnesian are irritant, purgative and unsatisfying to the thirst—as are the waters of the Paris basin—while excess of lime salts, as in the Mississippi Valley, gives rise to calculous concretions. Many diseases can thus be traced to defective water supply.

The greater amount of organic matter in the water of the upper Delaware is the result of its drainage from the swamps and vegetable decaying matters on the mountains above the Water Gap. Much of the impurity of the Schuylkill is gotten rid of in the precipitation which occurs in its course from the traversing by its waters, acidulated from the mines, of the limestone bed of rocks above Reading.

Mr. McKean was of the opinion that the assumption, because there is some albuminoid matter in the water we get from our hydrants, it is therefore unwholesome, was unfounded. He was doubtful if it had been made clear that the *albuminoids* and other matters presumably unwholesome, found in the supply of drinking water as furnished to us, are really unwholesome unless accompanied by antecedent extraneous fever germs. He adverted to the low death-rate of London and Philadelphia as militating against the theory of the great unwholesomeness of their drinking water.

In reply to a question by Mr. McKean, as to the proof of disease resulting from waters containing ammonia, Dr. Morris said we should carefully distinguish between albuminoids, and albuminoid ammonia and free ammonia. No one would doubt the unhealthiness of water contaminated with decaying or putrescent albuminous matters. The amount, however, of albuminoid and free ammonia—with the chlorides and nitrites—enables us to trace the previous life history of the water. As to such a supply being injurious to health, the record of the U. S. Army during operations along the Chickahominy, and the experiences of Dr. Livingstone and Stanley in Africa, afforded the illustrations required.

Dr. Koenig was of the opinion that the Schuylkill water was very much abused and was better than it looked. Its looks could be easily remedied by filtering. The substances in solution in Summer and Winter only differed by a *few milligrams to the litre*. The purifying action of the forebay was very great; that there was no appreciable difference in free ammonia above and below the dam.

Dr. Koenig believed that the danger of infection from disease germs from fecal matter in running water was very much overrated.

Dr. Horn and Mr. Burke also spoke on the subject.

The *Ives' Stratigraphic Geological Map* was exhibited and explained to the Society.

Pending nominations Nos. 1176, 1177, and 1178, and new nominations Nos. 1179 and 1180 were read.

The Committee on the Library reported having held a full meeting and having agreed on the purchase of a number of Encyclopedias, Dictionaries, etc., and works of reference, as ordered by the Society.

On motion, the Society authorized the construction of book-cases to contain these works of reference, at a cost not to exceed \$50.

The Publication Committee reported having authorized the publication of Prof. Cope's papers on the *Eryops* and on the *Puerco Fauna*, and that the same would finish the second part

of the XVIth Volume of the Transactions, which would then be issued.

The President reported that he had received and paid over to the Treasurer \$132.76, the quarterly interest due April 1, 1888, on the Michaux Legacy.

And the Society was adjourned by the President.

Stated Meeting, May 4, 1888.

Present, 29 members.

President, Mr. FRALEY, in the Chair.

Prof. W. P. Wilson, a lately elected member, was presented to the Chair, and took his seat.

Correspondence was submitted as follows, viz.: Program of the Annual Poetic Contest for the Prizes awarded by the Academia Regia Nederlandica.

Letters of envoy from Société de Litterature Finnoise, Helsingfors; K. Sächsische Gesellschaft der Wissenschaften, Leipzig.

Letters of acknowledgment from Société Royale des Sciences de Liège; Prof. G. Sergi, Rome; Radcliffe Observatory, Oxford, England; Buffalo Library (126); Newberry Library, Chicago; Elisha Mitchell Scientific Society, Chapel Hill, N. C. (96-126); Prof. C. V. Riley, Washington, D. C. (119).

The President reported that he had received, in answer to the proposed invitation for a congress to consider the project of an international scientific language, letters from Institute of Technology, Boston, Mass.; W. E. A. Axon, Manchester, England; Dr. L. Samenhoff, Warsaw, Russia; Yorkshire Geological and Polytechnic Society; Dr. F. S. Krauss, Vienna, Austria.